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hour, more or less; the length of time depending upon the intensity of the thermal agitation and upon the amount of energy absorbed during irradiation. Quartz which has not been subjected to ultra violet radiations for nearly a year is still strongly thermoluminescent.

Radiations of longer wave length than 340 mu. do not activate the quartz to any marked degree. The radiations emitted from the fused quartz are transmitted by glass apparently as well as by quartz.

Quartz crystals do not appear to exhibit either phosphorescence or thermoluminescence at temperatures below red heat. Crystals heated by C. E. Erion of the Chemistry Department, to 550°C and to 1100°C. and the cooled and subsequently irradiated fail to show any luminescent properties. However, crystals heated to 1600°C. and then cooled and irradiated with ultra violet light show the same characteristic glow as does fused quartz when heated.

Apparently the luminescent properties of quartz do not appear in the quartz crystals of alpha form. If the quartz is heated to a temperature sufficiently high to destroy the beta form of the crystal and thus to prevent the alpha form from appearing upon cooling of the crystal, the quartz then shows luminescent properties. It is very possible that the quartz in the beta form would exhibit fluorescence, but further work is necessary to establish the supposition.

It is also observed that pyrex is weakly thermoluminescent after being irradiated with ultra violet light. Fluorite and calcite are strongly thermoluminescent even from the absorption of ordinary daylight.

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We have not found in our work any region of ultra violet energy which will produce a stimulation of yeast growth in any synthetic medium used. In every case the action of the ultra violet radiations has produced a toxicity in the media in proportion to the amount of ultra violet received. Even fifteen minutes of ultra violet light at 16 cm. from the lamp produced such a toxicity in the

medium that the yeast count twenty-four hours afterwards was ten per cent below the control count.

There is no evidence of toxicity when only the salt solutions of pure water are irradiated and then added to the sugar solution. The toxicity is very marked when the sucrose solution is irradiated. The toxicity appears in sucrose, dextrose, glycerine, and calcium gluconate.

If irradiated air is bubbled through the medium, the toxicity does not appear as it does when ozone is bubbled through. The ozone, however, is not responsible for the retarded growth, except as it assists in the decomposition of the medium, for even after the irradiated medium has been heated to boiling before inoculation, the toxicity remains. Yeast also shows a very greatly retarded growth even if not inoculated into the medium until after two weeks subsequent to the irradiation. Our work shows that the direct effect of ultra violet upon the cell is not the only factor detrimental to yeast growth.

A VACUUM TUBE TESTER FOR ROUTINE WORK, USING ALTERNATING CURRENT

P. S. Helmick

Some form of vacuum tube tester is a necessity in every radio laboratory. The vacuum tube tester herewith described is the result of an effort to design a simple instrument suitable for routine work, and which could be left permanently connected to the lighting circuit thus being always ready for use.

Fig. 1 shows the connections of the tester. A small bell-dinging transformer is connected to a 110 volt source of alternating current, to give 6 volts filament current for the vacuum tube. In order that a certain discarded 5 milliampere meter could be used to measure the plate current of the tube, this meter was connected between the plate and one of the 6 volt terminals of the transformer. Finally a switch was installed to connect the grid with the plate, or to leave the grid on open circuit.

In order to test a tube, the tube is inserted in the socket, leaving the grid switch open, and the deflection of the meter is noted when the switch is opened and closed. A deflection of the meter shows that the grid of the tube is not touching the plate, and gives an indication of the electron emission of the tube.

Of course refinements could be added, such as a voltmeter and rheostat to regulate the filament potential, and a potentiometer